CAN-PC Interface

CPC-XT

User Manual

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Documentation for CAN-Interface CPC-XT.

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For technical assistance please contact:

Our products are continuously improved. Due to this fact specifications may be changed at any time and without announcement.

WARNING: CPC-XT hardware and software may not be used in applications where damage to life, health or private property may result from failures in or caused by these components.

Contents

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1 Overview

1.1 Attributes

- CAN interface for industrial applications
- Compact size for 8-bit slots
- CiA DS 102 and ISO 11898 compatible physical layer
- Equipped with Intel AN 82527or Philips SJA1000 CAN controller
- Extended ESD-protection of the CAN transceiver
- Galvanic decoupling between PC and CAN bus (optional)
- Alternative power supply of the CAN transceiver by PC or CAN bus
- Easy programming based on direct mapping of CAN controller registers into PC memory area
- Automatic address range detection by memory managers

1.2 General Description

CPC-XT is a short PC plug-in card for the CAN bus. With its small size and the possible application in 8 bit slots CPC-XT can be used in space restricted conditions as well. Designed for industrial series applications CPC-XT has a robust and cost efficient layout. CPC-XT supports different types of CAN controllers, the Full-CAN device INTEL AN 82527 as well as the Basic CAN device PHILIPS SJA1000.

CPC-XT maps the CAN controller into the PC address space and thus allows access to CAN messages with low latency. Existing software for the supported CAN controllers can easily be adapted. With CPC-XT the CAN communication may be handled either in interrupt controlled or in polled mode, the interrupt channels 3 – 7 are available.

CPC-XT can optionally be delivered with galvanic decoupling to the CAN bus. In this case power supply for the transceiver runs across the CAN bus or a DC/DC-converter.

1.3 Ordering Information

10-03-000-20	**CPC–XT/82527** CAN plug-in board with CAN controller Intel AN82527
10-03-001-20	**CPC–XT/82527-GTI** CAN plug-in board with CAN controller Intel AN82527, galvanic separation with internal supply
10-03-041-20	**CPC–XT/82527-GTB** CAN plug-in board with CAN controller Intel AN82527, galvanic separation with supply from the bus
10-03-200-20	**CPC–XT/SJA1000** CAN plug-in board with CAN controller Philips SJA1000
10-03-201-20	**CPC–XT/SJA1000-GTI** CAN plug-in board with CAN controller Philips SJA1000, galvanic separation with internal supply
10-03-241-20	**CPC–XT/SJA1000-GTB** CAN plug-in board with CAN controller Philips SJA1000, galvanic separation with supply from the bus

Note: the CAN controller type PHILIPS 82C200 used on older boards has been replaced by the successor type PHILIPS SJA1000. These two controllers are designed to be compatible but due to the enhanced capabilities of the SJA1000 the signature for the board with this controller was changed (see table on page 4).

2   Programming Interface

CPC-XT is mapped into the PC memory space with a base address in the area from C0000h to DE000h and occupies 512 Bytes. The availability of the CAN controller in the memory area makes the CAN communication direct and provides a low latency time. The memory occupied by CPC-XT is divided in two subranges. The first subrange contains the configuration registers of the card and starts at the base address. The second subrange allows access to the CAN controller and has 100h Bytes offset to the base address. The configuration registers are described in the following table:

Address offset	Access	Description
0	Read	Constant 55h for card detection
1	Read	Constant AAh for card detection
2	Read	Encoding of occupied memory range in units of 512 Byte
3	Read	Constant CBh for card detection
4	Read	Identification of CAN controller: 1: 82527 2: 82C200 **(older boards)** 8: SJA1000
6	Read	Status register
0	Write	Control register

The status register contains the actual state of CPC-XT.The bits have the following meaning:

Bit	Indication
0	Hardware reset active at CAN controller
1	CAN controller mapped into memory address range

Write accesses to the control register initiate actions within CPC-XT. The following table shows the transmitted data and the resulting action:

Value	Function
0	Hardware reset of CAN controller. The minimum reset time for the individual controllers is generated by the logic on CPC-XT.
2	Unmap CAN controller from memory address range.
3	Map CAN controller into memory address range.

Initialization of the CAN controller and CAN communication are done by accesses to the CAN controller registers. The register description may be taken from the data sheet of the individual controller.

3 Electrical Characteristics

3.1 Absolute Limiting Values

Any (also temporary) stress in excess of the limiting values may cause permanent damage on CPC-XT and connected devices.

Parameter	Min	Max	Unit
Storage temperature	– 20	80	ºC
Operating temperature*	0	60	ºC
Voltage on the bus connections	– 30	30	V
Current across ground connection	–	1	A

* Extended temperature range on demand

3.2 Nominal values

Parameter	Min	Typ	Max	Unit
Power supply on Pin B3 of the PC expansion slot	4,75	5	5,25	V
Power supply on Pin B9 of the PC expansion slot	10,8	12	13,2	V
Voltage on bus pins*	– 30	–	30	V
Clock frequency	–	16	–	MHz

* This voltage is measured against the ground potential of the CAN transceiver. Older board versions are equipped with PCA82C250 CAN transceivers. In this case lower limits apply.

4   Operating Instructions

4.1   Pin configuration of CAN connector

The CAN-Interface-connector (D-Sub 9 male) complies to CiA Standard DS 102. The pin usage is detailed in the following table:

Pin 1	–	Reserved by CiA
Pin 2	CAN_L	CAN_L bus line (dominant low)
Pin 3	GND	Ground
Pin 4	–	Reserved by CiA
Pin 5	–	Reserved by CiA
Pin 6	GND	Optional ground, internally connected to Pin 3
Pin 7	CAN_H	CAN_H bus line (dominant high)
Pin 8	–	Reserved by CiA (error signal)
Pin 9	V+CAN	Power supply from CAN bus (option-GTB)

4.2   Configuration

The configuration of the address space and the used interrupt channel is achieved by jumpers on CPC-XT. Figure 1 shows their positions on the board.
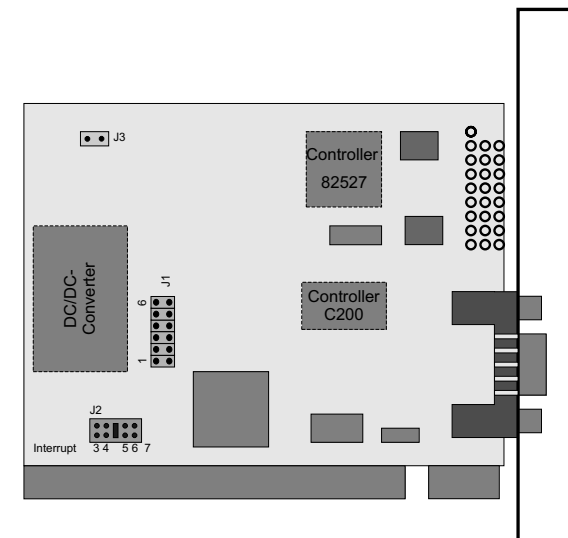
The base address is set with jumper bank 1. The possible selections are listed in figure 2.

Base adress J1 — 0C0000h, 0C2000h, 0C4000h, 0C6000h, 0C8000h, 0CA000h, 0CC000h, 0CE000h; 0D0000h, 0D2000h, 0D4000h, 0D6000h, 0D8000h, 0DA000h, 0DC000h, 0DE000h

Jumper bank 2 determines the used interrupt channel. The settings can be seen in figure 3; the configuration for interrupt channel 5 is shown. It is not allowed to set more than one jumper on this bank.

Jumper Allocation:

IRQ line
IRQ 7
IRQ 6
IRQ 5
IRQ 4
IRQ 3
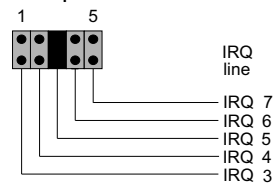
Jumper J3 (optional) allows configurations without galvanic decoupling to supply +12V from the PC to the CAN. J3 may only be set if no other device supplies the CAN power line and

the PC has enough capablility on its +12V line. This feature does not provide protections against overvoltage, overload, short circuit or other error conditions. The use of this option is in the responsibility of the user.

4.3 Installation

CPC-XT may be installed in an empty ex-pan-sion slot on the motherboard of your IBM-XT or IBM-AT compatible computer. To avoid damage please pay attention to the follo-wing hints:

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WARNING: Computer devices and components are sensitive against static discharge. For this rea-son keep CPC-XT in the antistatic cover until installing. Just before removing CPC-XT from the protection cover touch the metal case of your computer.

Avoid damage by achieving equal potential between all devices on the CAN before plug-ging the connection.

To the rear side connector of CPC-XT only CAN networks with a connector and electrical character complying with CiA DS-102 may be attached.

PC interface and CAN bus are not galvanic decoupled in the standard version of CPC-XT. Use in systems with diverging ground potential of PC and CAN bus is not permitted in this case.

Besides the instructions mentioned in this ma-nual carefully observe the instructions in your computers users manual.

If you are not sure about the installation please contact **EMS Dr. Thomas Wünsche**.

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Execute the following steps for installation:

- Disconnect your computer from the po-wer line.
- Open the case of your computer and re-move the cover of the expansion slot rear panel.
- Insert CPC-XT carefully into the ISA or EISA slot: therefore take the card at its top corners and shift it down into the slot equally. Push onto the upper side of CPC-XT to achieve correct seat in the slot.
  If the card can not be inserted wit-hout problems, please dont't use ex-tensive force. Remove the card and retry.
- Fix the mounting screw and close the PC case. Connect the required cables.